

Listing of Claims

This listing of claims replaces without prejudice or disclaimer all previous listings of claims.

1. (Currently Amended) A communication system comprising:

at least two communication networks over which communications between physical devices connected to said communication networks are to be carried, said communication networks implementing different protocols for messaging; and

a communication server acting between said communication networks and through which messages transmitted between said communication networks pass, said communication server ~~including~~ comprising a knowledge base storing information identifying each physical device registered in said communication system, information identifying registered connections available in said communication system including protocol conversion information for each registered connection where necessary and information identifying the status of each actual connection between physical devices in said communication system, said communication server accessing said knowledge base upon receipt of a message and searching said knowledge base for appropriate protocol conversion information, wherein during said searching said communication server initially uses a header of said message as a key to searching said knowledge base for said protocol conversion information and if said search fails, said communication server uses a body of said message as said key to search said knowledge base for said protocol conversion information, said communication server converting the protocol of the received message to a protocol compatible with the communication network to which said message is being sent using the determined protocol conversion information.

2. (Previously Presented) A communication system as defined in claim 1 wherein said communication server includes virtual devices communicating with said communication networks and a virtual gateway bridging said virtual devices, said virtual gateway accessing said knowledge base and converting protocols of said messages.

3. (Previously Presented) A communication system as defined in claim 2 wherein said virtual gateway includes a preprocessor, a processor and a postprocessor, said preprocessor examining each incoming received message to locate target logical connection information determining the

target destination for said incoming message, said target logical connection information being used as said key, said processor converting the protocol of each incoming message, where appropriate, based on the results of said search using said target logical connection information, said postprocessor wrapping each message received from said processor with headers, where appropriate.

4. (Previously Presented) A communication system as defined in claim 3 wherein one of said communication networks is a wireless network and wherein one of said communication networks is a wired land-line network.

5. (Previously Presented) A communication system as defined in claim 4 wherein messages transmitted over said wireless network, include API message bodies to be processed by destination physical devices and logical message headers including target logical connection information specifying the destinations for said API message bodies, said logical message headers wrapping said API message bodies.

6. Cancelled

7. (Previously Presented) A communication system as defined in claim 5 wherein said preprocessor strips the logical message header from said API message body upon receipt of a message from said wireless network and uses the target logical connection information in said logical message header as said key to search said knowledge base for said protocol conversion information.

8. (Previously Presented) A communication system as defined in claim 7 wherein said preprocessor analyzes the API message body upon receipt of a message received from said wireless network for said target logical connection information if said target logical connection information cannot be determined from said logical message header and uses the target logical connection information in said API message body as said key to search said knowledge base for said protocol conversion information.

9. (Currently Amended) A communication system as defined in claim 4 wherein messages transmitted over said land-line network ~~only~~ include API message bodies without headers, said

preprocessor analyzing the API message body upon receipt of a message received from said land-line network for said target logical connection information and using the target logical connection information in said API message body as said key to search said knowledge base for said protocol conversion information.

10. (Currently Amended) A communication server acting as a gateway for the transmission of messages between two virtual devices communicating with networks implementing different protocols, said communication server comprising:

a knowledge base storing information identifying each physical device registered in said communication system, information identifying registered connections available in said communication system including protocol conversion information for each registered connection where necessary to convert messages of one protocol to a different protocol and information identifying the status of each actual connection between physical devices in said communication system; and

a virtual gateway accessing said protocol conversion information upon receipt of a message to be transmitted between said virtual devices and converting the protocol of said message to a protocol compatible with the network to which said message is being sent, said communication server accessing said knowledge base upon receipt of a message and initially searching said knowledge base for appropriate protocol conversion information using a header of said message as a key to locating said protocol conversion information in said knowledge base, said communication server using a body of said message as said key if said initial search fails or if said message does not include a header.

11. (Previously Presented) A communication server as defined in claim 10 wherein said virtual gateway includes a preprocessor, a processor and a postprocessor, said preprocessor examining each incoming received message to locate target logical connection information determining the target destination for said incoming message, said target logical connection information being used as said key, said processor converting the protocol of each incoming message, where appropriate, based on the results of said search using said target logical connection information, said postprocessor wrapping each message received from said processor with headers, where appropriate.

12. (Original) A communication server as defined in claim 11 further including a tool kit to setup said knowledge base with said protocol conversion information.

13. (Original) A communication server as defined in claim 12 wherein said virtual gateway updates said protocol conversion information based on message traffic therethrough.

Claims 14 to 19. Cancelled

20. (Currently Amended) A communication system as defined in claim 8 wherein messages transmitted over said land-line network ~~only~~ include API message bodies without headers, said preprocessor analyzing the API message body upon receipt of a message received from said land-line network for said target logical connection information and using the target logical connection information in said API message body as said key to search said knowledge base for said protocol conversion information.

21. (Previously Presented) A communication server as defined in claim 11 wherein said messages include API message bodies and logical message headers, said API message bodies and logical message headers including target logical connection information specifying the destinations for said messages.

22. (Previously Presented) A communication server as defined in claim 21 wherein said preprocessor strips the logical message header from said API message body upon receipt of a message and uses the target logical connection information in the logical message header as said key to search said knowledge base for said protocol conversion information.

23. (Previously Presented) A communication server as defined in claim 22 wherein said preprocessor analyzes the API message body for the target logical connection information if the target logical connection information cannot be determined from the logical message header or if said search fails and uses the target logical connection information in the API message body as said key.

24. Cancelled

25. (Currently Amended) A communication server acting as a gateway for the transmission of messages between two virtual devices communicating with networks implementing different protocols, said communication server comprising:

a knowledge base ~~storing~~ comprising a registry identifying each physical device registered to deliver messages for transmission between said virtual devices and through said gateway, a logical table identifying each registered connection available between physical devices and protocol conversion information required for each registered connection to convert messages of one protocol to a different protocol and a dynamic database identifying the current status of each actual connection between physical devices; and

a virtual gateway accessing said knowledge base for protocol conversion information upon receipt of a message to be transmitted between said virtual devices and converting the protocol of said message to a protocol compatible with the network to which said message is being sent wherein said virtual gateway updates the protocol conversion information and the current status information in said knowledge base based on message traffic therethrough.

26. Cancelled

27. (Previously Presented) A communication server as defined in claim 25 wherein one of said networks is a wireless network and wherein another of said networks is a wired land-line network.

28. (Previously Presented) A communication server as defined in claim 27 wherein said virtual gateway unwraps headers accompanying incoming received messages and uses target logical connection information in the headers as keys to search said knowledge base for said protocol conversion information.

29. (Previously Presented) A communication server as defined in claim 28 wherein said virtual gateway analyzes the bodies of incoming messages for target logical connection information if the target logical connection information cannot be determined from the headers.

30. (Currently Amended) A communication server acting as a gateway for the transmission of messages between two virtual devices communicating with networks implementing different protocols, said communication server comprising:

a ~~self-updating~~ knowledge base ~~storing~~ comprising a registry identifying each physical device registered to deliver messages for transmission between said virtual devices and through said gateway, a logical table identifying each registered connection available between physical devices and protocol conversion information required for each registered connection to convert messages of one protocol to a different protocol and a dynamic database identifying the current status of each actual connection between physical devices; and

a virtual gateway accessing said knowledge base upon receipt of a message, said virtual gateway initially searching said knowledge base for appropriate protocol conversion information using target logical connection information in a header of said message and if said search fails, searching said knowledge base for appropriate protocol conversion information using target logical convention information in a body of said message.

31 Cancelled

32. (Currently Amended) A communication system comprising:

a wireless network and a wired network over which communications between physical devices connected to said networks are to be carried, said wireless and wired networks implementing different protocols for messaging; and

a communication server acting between said wireless and wired networks and through which messages transmitted between said wireless and wired networks pass, said communication server including a ~~self-updating~~ knowledge base storing information identifying each physical device registered in said communication system, information identifying registered connections available in said communication system including protocol conversion information for each registered connection where necessary and information identifying the status of each actual connection between physical devices in said communication system, said communication server accessing said knowledge base upon receipt of a message and searching said knowledge base for appropriate protocol conversion information, said communication server converting the protocol of a received message to a protocol compatible with the network to which said message is being sent using said protocol conversion information, wherein during said searching said communication server follows a multi-pass search procedure to locate said protocol conversion information, each pass of said procedure using a different portion of said message as a key to search said knowledge base for said protocol conversion information.

33. (Previously Presented) A communication system as defined in claim 32 wherein during a first pass of said procedure, a header of said message is used as said key and wherein during another pass of said procedure a body of said message is used as said key.

34. (Previously Presented) A communication system as defined in claim 33 wherein during a second pass of said procedure, a second header of said message is used as said key.

35. (Previously Presented) A communication system as defined in claim 33 wherein said communication server updates said knowledge base based on message traffic therethrough.

36. (Currently Amended) A communication server acting as a gateway for the transmission of messages between two virtual devices communicating with networks implementing different protocols, each message including a virtual device message header, a logical message header and a message body, said communication server comprising:

a knowledge base storing information identifying each physical device registered in said communication system, information identifying registered connections available in said communication system including protocol conversion information for each registered connection where necessary to convert messages of one protocol to a different protocol and information identifying the status of each actual connection between physical devices in said communication system; and

a virtual gateway accessing said knowledge base upon receipt of a message and searching said knowledge base for appropriate protocol conversion information initially using target logical connection information in a header of said message, and then using target logical connection information in said message body if the initial search fails.

37. (Previously Presented) A communication server as defined in claim 36 wherein said virtual gateway searches said knowledge base firstly using target logical connection information in said virtual device message header and then using target logical connection information in said logical message header if the search using the target logical connection information in said virtual device message header fails prior to using target logical connection information in said message body.

38. (Previously Presented) A communication system as defined in claim 37 wherein said communication server updates said knowledge base based on message traffic therethrough.

39. (New) A communication system as defined in claim 1 wherein physical device identifications are stored in a registry of said knowledge base, wherein registered connection identifications and related protocol conversion information are stored in a logical table of said knowledge base and wherein actual connection status information is stored in a dynamic updatable database of said knowledge base.

40. (New) A communication system as defined in claim 39 wherein said registry stores a record for each registered physical device, said record comprising a physical device ID, an application ID, a virtual device ID and a physical ID to logical ID mapping.

41. (New) A communication system as defined in claim 40 wherein each registered connection identification includes logical connection IDs, logical device IDs, virtual device IDs, and logical message and virtual device message wrapping and unwrapping information.

42. (New) A communication server as defined in claim 10 wherein physical device identifications are stored in a registry of said knowledge base, wherein registered connection identifications and related protocol conversion information are stored in a logical table of said knowledge base and wherein actual connection status information is stored in a dynamic updatable database of said knowledge base.

43. (New) A communication server as defined in claim 42 wherein said registry stores a record for each registered physical device, said record comprising a physical device ID, an application ID, a virtual device ID and a physical ID to logical ID mapping.

44. (New) A communication server as defined in claim 43 wherein each registered connection identification includes logical connection IDs, logical device IDs, virtual device IDs, and logical message and virtual device message wrapping and unwrapping information.

45. (New) A communication server as defined in claim 25 wherein said registry stores a record for each registered physical device, said record comprising a physical device ID, an application ID, a virtual device ID and a physical ID to logical ID mapping.

46. (New) A communication server as defined in claim 45 wherein each registered connection identification includes logical connection IDs, logical device IDs, virtual device IDs, and logical message and virtual device message wrapping and unwrapping information.

47. (New) A communication server as defined in claim 30 wherein said registry stores a record for each registered physical device, said record comprising a physical device ID, an application ID, a virtual device ID and a physical ID to logical ID mapping.

48. (New) A communication server as defined in claim 47 wherein each registered connection identification includes logical connection IDs, logical device IDs, virtual device IDs, and logical message and virtual device message wrapping and unwrapping information.

49. (New) A communication system as defined in claim 32 wherein physical device identifications are stored in a registry of said knowledge base, wherein registered connection identifications and related protocol conversion information are stored in a logical table of said knowledge base and wherein actual connection status information is stored in a dynamic updatable database of said knowledge base.

50. (New) A communication system as defined in claim 49 wherein said registry stores a record for each registered physical device, said record comprising a physical device ID, an application ID, a virtual device ID and a physical ID to logical ID mapping.

51. (New) A communication system as defined in claim 50 wherein each registered connection identification includes logical connection IDs, logical device IDs, virtual device IDs, and logical message and virtual device message wrapping and unwrapping information.

52. (New) A communication server as defined in claim 36 wherein physical device identifications are stored in a registry of said knowledge base, wherein registered connection identifications and related protocol conversion information are stored in a logical table of said

knowledge base and wherein actual connection status information is stored in a dynamic updatable database of said knowledge base.

53. (New) A communication server as defined in claim 52 wherein said registry stores a record for each registered physical device, said record comprising a physical device ID, an application ID, a virtual device ID and a physical ID to logical ID mapping.

54. (New) A communication server as defined in claim 53 wherein each registered connection identification includes logical connection IDs, logical device IDs, virtual device IDs, and logical message and virtual device message wrapping and unwrapping information.